

# Babesiosis



## Section 1:

## ABOUT THE DISEASE

### A. Etiologic Agent

Babesiosis is caused by microscopic parasites (protozoa) of the genus *Babesia*. The species responsible for causing the disease in humans in the U.S. are *B. microti* and its close relatives.

### B. Clinical Description

Most infections with *B. microti* are asymptomatic. Many of the clinical features of babesiosis resemble malaria, including loss of appetite, fatigue, and a fever as high as 104°F. Fever may be recurrent. Patients also report chills, sweats, muscle and joint pain, and nausea. The protozoa infect red blood cells and eventually cause their destruction, leading to anemia (lasting from several days to a few months), jaundice, a swollen liver, and an enlarged spleen. For most patients, recovery is spontaneous, and the illness is relatively mild. However, the clinical course of babesiosis can be potentially severe and sometimes fatal. The illness is generally worse among individuals who are immunocompromised, who have no spleen, who have a dysfunctional spleen, or who are over the age of 60. When indicated, treatment is with antibiotics. Co-infection with the agent of Lyme disease or other pathogens carried by ticks may complicate the clinical picture and may lead to more serious illness.

### C. Vectors and Reservoirs

The primary vectors for babesiosis are *Ixodes* ticks. In Massachusetts, the prominent vector is *I. scapularis*, or the deer tick. This is the same tick that carries and transmits the agents of Lyme disease and human granulocytic ehrlichiosis (see chapters on these other diseases for more information). Ticks acquire the protozoa that cause babesiosis during their young, larval stage by feeding on infected animals, particularly the white-footed deer mouse. During its next developmental stage (nymphal stage), the tick poses the greatest threat of transmitting the infectious organisms to the animals and humans that it bites. Deer tick nymphs are most abundant in Massachusetts between May and July, and they are typically found in grasses and brush. Towards the end of summer through fall, nymphs mature to the adult stage. Adult deer ticks are also capable of transmitting *B. microti* to humans. The longer a tick remains attached to a body, the higher the likelihood of disease transmission.

### D. Modes of Transmission

Babesiosis is acquired from a tick bite. However, bites from *I. scapularis* are often painless and may occur on parts of the body that are difficult to observe, so cases may have no known history of a tick bite. Since *I. scapularis* also transmits *Borrelia burgdorferi*, the bacterium that causes Lyme disease, and *Anaplasma phagocytophila*, the bacterium that causes human granulocytic ehrlichiosis, co-infection is possible. Under rare circumstances, babesiosis may be transmitted perinatally or by blood transfusion.

### E. Incubation Period

The incubation period ranges from 1–8 weeks, although occasionally, it can be longer.

## F. Period of Communicability or Infectious Period

With the rare exceptions of direct blood transfusion or perinatal transmission, babesiosis is not communicable from person-to-person. Cases should be excluded from blood donation. In some asymptomatic individuals, parasitaemia may last for months or even years.

## G. Epidemiology

The incidence of babesiosis is associated with the density of infected tick vectors and their animal hosts. As with Lyme disease, most cases of babesiosis arise during the summer and early fall. In the U.S., cases are most commonly reported in the northeastern states, including Massachusetts, Rhode Island, Connecticut, and New York. Most cases in Massachusetts are reported from Cape Cod, Martha's Vineyard, and Nantucket.

## H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.



## Section 2:

# REPORTING CRITERIA AND LABORATORY TESTING

## A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any of the following:

- ◆ Any person with a positive identification of *Babesia* on blood smear; or
- ◆ Suspect cases with positive serologic results.

*Note: See Section 3C for information on how to report a case.*

## B. Laboratory Testing Services Available

Although the MDPH State Laboratory Institute (SLI) does not provide testing services for *Babesia* at the time of this printing, development and evaluation of serological assays are in progress. At present, the SLI Viral Serology Laboratory can forward serum specimens to the Centers for Disease Control and Prevention (CDC) for testing.

*Note: The SLI does not perform tick identification or testing of ticks for Babesia.*



## Section 3:

**REPORTING RESPONSIBILITIES AND CASE INVESTIGATION****A. Purpose of Surveillance and Reporting**

- ◆ To estimate the prevalence of babesiosis in Massachusetts.
- ◆ To identify where babesiosis occurs in Massachusetts.
- ◆ To recognize areas in Massachusetts where babesiosis incidence has increased or decreased.
- ◆ To focus prevention education.
- ◆ To target tick control measures.

**B. Laboratory and Health Care Provider Reporting Requirements**

Babesiosis is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of babesiosis, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of babesiosis infection shall report such evidence of infection directly to the MDPH within 24 hours.

**C. Local Board of Health (LBOH) Reporting and Follow-up Responsibilities***Reporting Requirements*

MDPH regulations (*105 CMR 300.000*) stipulate that babesiosis is reportable to the LBOH and that each LBOH must report any case of babesiosis or suspect case of babesiosis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Babesiosis Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

*Case Investigation*

1. It is the responsibility of the LBOH to complete the MDPH *Babesiosis Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record.
2. Use the following guidelines to assist in completing the form:
  - a. Demographic information: Accurately record the contact information of the case as well as the case's age, sex, race, and occupation.
  - b. Clinical information: Note the symptom onset date and check off all reported symptoms. Also note whether the case is pregnant, immuno-compromised, or has a functional spleen. Record treatment information, hospitalization information including location and associated dates, and physician contact information.
  - c. Laboratory information: Check off all appropriate tests performed and attach a copy of any laboratory results. Also note if the case was tested for other tick-borne diseases such as Lyme disease or human granulocytic

ehrlichiosis. Please refer to other chapters of this manual and complete the appropriate forms if the case tested positive for another tick-borne disease.

- d. Exposure information: Use the incubation period range for babesiosis (1–8 weeks). Specifically, focus on the period beginning a minimum of one week prior to the case's onset date back to no more than eight weeks before onset date for the following exposures:
    - i. Tick bite history: Determine if the case was bitten by a tick. If yes, ask about and record information about date(s) and geographic location(s) where he/she was bitten.
    - ii. Travel history: Determine the geographic area(s) visited by the case, including known areas of high risk such as Cape Cod, Martha's Vineyard, and Nantucket.
    - iii. Blood transfusion: Note whether the case has had a blood transfusion. If yes, record the date.
  - e. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
3. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

**MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)**  
**305 South Street, 5<sup>th</sup> Floor**  
**Jamaica Plain, MA 02130**  
**Fax: (617) 983-6813**

4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.



## Section 4:

# CONTROLLING FURTHER SPREAD

### A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

#### *Minimum Period of Isolation of Patient*

No restrictions, except exclusion from blood donation.

#### *Minimum Period of Quarantine of Contacts*

No restrictions.

### B. Protection of Contacts of a Case

None.

**As mentioned in Section 1F, babesiosis is not communicable from person to person (with the rare exceptions of direct blood transfusion and perinatal transmission).**

## C. Managing Special Situations

### *Response to a Tick Bite*

The longer a tick remains attached to the body, the higher the likelihood of disease transmission. When an attached tick is removed from the body, the individual should be monitored for the appearance of a rash, fever, or flu-like symptoms. Should any symptoms occur, the individual should immediately seek the advice of a health care provider, especially if the tick was attached for more than 24 hours. It may be helpful to save the tick after removal for two reasons: 1) if the person who was bitten develops signs or symptoms, such as fever, flu-like symptoms, or a rash, it may be helpful for the physician to know the type of tick; and 2) depending on the circumstances of the bite (i.e., when a person was bitten, the type of tick, how long it was attached), a physician may choose to treat the person who was bitten. The tick may be kept either securely sealed within a small plastic bag or attached—with clear tape—to a piece of paper. For individuals who do not wish to keep the tick, it can be either drowned in rubbing alcohol or flushed down the toilet.

*Note: The MDPH does not provide tick identification or tick testing services. A listing of agencies that provide these services for a fee is available on the MDPH website at [www.mass.gov/dph/cdc/epi/lyme/lymehp.htm](http://www.mass.gov/dph/cdc/epi/lyme/lymehp.htm).*

When testing a tick, the following information should be taken into account:

- ◆ Tests performed on the ticks are not perfect, and they do not test for all infections that ticks may carry. Therefore, even with a negative result, people should still monitor for the appearance of a rash, fever, or other unusual symptoms, and they should immediately seek the advice of a health care provider should any symptoms occur.
- ◆ If someone has been infected by a tick bite, symptoms may begin before the results of tick testing are available. People should not wait for tick testing results before seeking medical advice should symptoms develop.
- ◆ A positive test on a tick is not an automatic indication that treatment is needed. A positive test indicates that the tick was infected but not that the tick was successful in spreading the infection to the person bitten. The longer a tick is attached, the greater the chance that it will spread infection. Positive test results should be discussed with a health care provider.

## D. Preventive Measures

### *Environmental Measures*

- ◆ Keep grass cut short.
- ◆ Remove leaf litter and brush from around the yard.
- ◆ Prune low lying bushes to let in more sunlight.
- ◆ Keep woodpiles and birdfeeders off the ground and away from the home.
- ◆ Keep the plants around stone walls cut short.
- ◆ Use a three-foot wide woodchip, mulch, or gravel barrier where the lawn meets the woods, and remind children not to cross that barrier.
- ◆ Ask a landscaper or local nursery about plants to use in the yard that do not attract deer.

- ◆ Use deer fencing (for yards 15 acres or more).

If you choose to use a pesticide to reduce the number of ticks on your property, hire a licensed applicator who is experienced with tick control. Your local landscaper or arborist may be a licensed applicator. In general, good tick control can be achieved with no more than two pesticide applications in one year. When selecting an applicator, ask if they will provide:

- ◆ A written pest control plan that includes information on the pesticide to be used.
- ◆ Information about non-chemical pest control alternatives.
- ◆ Signs to be posted around the property after the application.

### *Personal Preventive Measures/Education*

There is no vaccine to protect someone from babesiosis. If someone lives, works, or spends leisure time in an area likely to have ticks, they should be advised of the following:

- ◆ The single most important thing one can do to prevent a tick-borne disease is to check oneself for ticks once a day. Favorite places ticks like to go on the body include areas between the toes, back of the knees, groin, armpits, neck, along the hairline, and behind the ears. Remember to check children and pets, too. Promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out using steady pressure.
- ◆ Stick to main pathways and the centers of trails when hiking.
- ◆ Wear long-sleeved, light colored shirts and long pants tucked into socks.
- ◆ Talk to a veterinarian about the best ways to protect pets and livestock from ticks.
- ◆ Use repellents containing DEET (N,N-diethyl-m-toluamide), and choose a product that will provide sufficient protection for the amount of time spent outdoors. Product labels often indicate the length of time that someone can expect protection from a product. DEET is considered safe when used according to the manufacturer's directions. The efficacy of DEET levels off at a concentration of 30%, which is the highest concentration recommended for children and adults. DEET products should not be used on children less than two months of age. Mosquito netting may be used to cover infant carriers or to protect other areas for children less than two months of age. The following precautions should be observed when using DEET products:
  - Avoid using DEET products that combine the repellent with a sunscreen. Sunscreens may need to be reapplied too often, resulting in an over application of DEET.
  - Apply DEET on exposed skin using only as much product as needed.
  - Do not use DEET on the hands of young children, and avoid applying repellent to areas around the eyes and mouth.
  - Do not use DEET over cuts, wounds, or irritated skin.
  - Wash treated skin with soap and water after returning indoors, and wash treated clothing.
  - Avoid spraying DEET products in enclosed areas.

Picardin (KBR 3023) is a relatively new repellent that is now available in the U.S. Recent studies have shown it to be safe and effective. Picardin-containing repellents should be used according to the manufacturer's recommendations.

Permethrin-containing products will kill mosquitoes and ticks on contact. Permethrin products are not designed to be applied to the skin. Clothing should be treated and allowed to dry in a well-ventilated area prior to wearing.

Permethrin binds tightly to fabrics, and therefore, very little of the permethrin gets onto the skin once the fabric is dry.

A number of plant-derived products are available for use as repellents, but most of these products do not provide the same level or duration of protection as products containing DEET. However, there are studies that show that oil of lemon eucalyptus [p-methane 3,8-diol(PMD)] provides as much protection as low concentrations of DEET when tested against mosquitoes found in the U.S.

**A Babesiosis Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at [www.mass.gov/dph](http://www.mass.gov/dph). Click on the “Publications and Statistics” link, and select the “Public Health Fact Sheets” section under “Communicable Disease Control.”**



## ADDITIONAL INFORMATION

There is currently no formal CDC surveillance case definition for babesiosis. For reporting a case to the MDPH, always refer to the criteria outlined in Section 2A of this chapter.



## REFERENCES

American Academy of Pediatrics. [Babesiosis.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26<sup>th</sup> Edition*. Elk Grove Village, IL, American Academy of Pediatrics; 2003: 211–212.

American Academy of Pediatrics Committee on Environmental Health. *AAP News*. June 2003.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. 1997; 46(RR-10).

Heymann, D., ed. *Control of Communicable Diseases Manual, 18<sup>th</sup> Edition*. Washington, DC, American Public Health Association, 2004.

MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements*. MDPH, Promulgated November 4, 2005.

“What You Need to Know about Mosquito Repellent.” Centers for Disease Control and Prevention. August 3, 2005. <[www.cdc.gov/ncidod/dvbid/westnile/mosquitorepellent.htm](http://www.cdc.gov/ncidod/dvbid/westnile/mosquitorepellent.htm)>.



## **FORMS & WORKSHEETS**

*Babesiosis*



# Babesiosis

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## LBOH Action Steps

*This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to babesiosis case investigation activities.*

LBOH staff should follow these steps when babesiosis is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ☐ Obtain copies of relevant laboratory reports.
- ☐ Fill out the case report form (attach laboratory results).
- ☐ Send the completed case report form, with the attached laboratory reports, to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).